ABSTRACT:

In this work, the use of type-2fuzzylogicsystems as a novel approach for predicting permeability from well logs has been investigated and implemented. Type-2fuzzylogicsystem is good in handling uncertainties, including uncertainties in measurements and data used to calibrate the parameters. In the formulation used, the value of a membership function corresponding to a particular permeability value is no longer a crisp value; rather, it is associated with a range of values that can be characterized by a function that reflects the level of uncertainty. In this way, the model will be able to adequately account for all forms of uncertainties associated with predicting permeability from well log data, where uncertainties are very high and the need for stable results are highly desirable. Comparative studies have been carried out to compare the performance of the proposed type-2fuzzylogicsystem framework with those earlier used methods, using five different industrial reservoir data. Empirical results from simulation show that type-2fuzzylogic approach outperformed others in general and particularly in the area of stability and ability to handle data in uncertain situations, which are common characteristics of well logs data. Another unique advantage of the newly proposed model is its ability to generate, in addition to the normal target forecast, prediction intervals as its by-products without extra computational cost.